

Amendments to the Specification

Please rewrite the paragraph on page 8, lines 6-15 as follows:

The local oscillator circuit 2 comprises a voltage-controlled oscillator (VCO) 7, an oscillation-signal amplifier circuit 8, and a reference-oscillation circuit 9. The oscillation-signal amplifier circuit 8 comprises an amplifier 10, a times-three frequency multiplier 11, and a band-pass filter 12. The reference-oscillation circuit 9 comprises a reference oscillator 13, a times-three (x3) frequency multiplier 14, an amplifier 15, a sampling phase detector (SPD) 16, an amplifier 17, and a divide-by-four frequency (1/4) divider 18.

Please rewrite the paragraph on page 8, line 25 to page 9, line 19 as follows:

Meanwhile, in the reference-oscillation circuit 9, the reference oscillator 13 generates oscillation signals with a 40 MHz frequency, then the times-three frequency multiplier 14 converts the 40 MHz frequency to a frequency of ~~the~~ 120 MHz, and subsequently the amplifier 15 amplifies the signals and transmits them to the sampling phase detector 16. The sampling phase detector 16 receives two kinds of oscillation signals, i.e., one with a 120 MHz frequency amplified at the amplifier 15, the other with a 9 GHz frequency generated at the voltage-controlled oscillator 7 and amplified at the amplifier 10, and produces phase-comparison error signals due to the phase difference between these two kinds of signals. That is to say, a closed loop consisting of the voltage-controlled oscillator 7, the amplifier 10, the sampling phase detector 16, and the amplifier 17 serves as a phase-locked loop (hereinafter, referred to as PLL). Since the PLL allows the voltage-controlled oscillator 7 to generate signals with a frequency of 9 GHz reliably, the amplifier 10 amplifies the oscillation signals with a frequency of 9 GHz received from the voltage-controlled oscillator 7 and transmits them to the times-three frequency multiplier 11 as described above.

Please rewrite the paragraph on page 11, lines 3-10 as follows:

The electronic circuit unit according to the embodiments is used as a satellite communication transmitter having the above described circuit configuration. As shown in Figs. 1 to 3, the electronic circuit unit comprises an aluminum die-cast main casing 30 constituting a frame, and a radiator 31 (Fig. 3). The radiator 31 comprises

a sub-casing 32 and a radiation plate 33, which are integrally bonded to each other as shown in Fig. 3.

Please rewrite the paragraph on page 11, line 11 to page 12, line 1 as follows:

The main casing 30 has an almost whole bottom and no top formed by aluminum die-casting. The main casing 30 has an aluminum die-cast first waveguide groove 34 formed in the outer surface of a sidewall thereof and an opening 30a extending from the aforementioned sidewall to the bottom as shown in Fig. 3. Further, the main casing 30 has a lid 35 formed by aluminum die-casting and screwed to the outer surface of the sidewall thereof so as to cover the first waveguide groove 34. The main casing 30 has a first circuit board 36 (see Figs. 2, 3) disposed therein. The first circuit board 36 has a cut-out at a corner thereof shaped so as to match the shape of the opening 30a. The first circuit board 36 has the circuit components of the intermediate-frequency amplifier circuit 1 and the local oscillator circuit 2 shown in Fig. 11 mounted thereon, but excluding those of the hybrid power-amplifier circuit 3. The main casing 30 has a cover plate 37 (see Figs. 1, 3) screwed to the top ends of the four sidewalls thereof so as to cover the open top thereof.

Please rewrite the paragraph on page 12, lines 2-19 as follows:

As shown in Figs. 4 to 6, the sub-casing 32 is formed to have a bottom and no top, and has a second circuit board 38 (see Figs. 5, 6) disposed therein. The sub-casing 32 has a cover plate 39 (see Figs. 4, 5) attached on the open top thereof so as to tightly seal the inside thereof. The sub-casing 32 has a second waveguide groove 40 formed in the outer surface of a sidewall thereof. The sub-casing 32 and the cover plate 39 are formed of copper, which has a larger thermal conductivity than aluminum which is used for the main casing 30, and have a corrosion-resistant gold plating provided on the surfaces thereof. The second circuit board 38 has the hybrid power-amplifier 3 of the circuit configuration shown in Fig. 11 mounted thereon. The sub-casing 32 and the cover plate 39 define two circuits, i.e., the combination of the intermediate-frequency amplifier circuit 1 and the local oscillator circuit 2, which are mounted on the first circuit board 36, and the hybrid power-amplifier circuit 3 mounted on the second circuit board 38 in the main casing 30.

Please rewrite the paragraph beginning on page 12, line 20 and ending on page 13, line 12 as follows:

The second circuit board 38 is fixed to the inner bottom surface of the sub-casing 32 by screwing a plurality of metal fixing members 41 (see Figs. 5, 6). The fixing members 41 divide the second circuit board 38 into a plurality of areas. Although not shown in the drawings, the frequency converter 20 and the band-pass filters 21 and 23 among the circuit components of the hybrid power-amplifier circuit 3 of Fig. 11 are each mounted on the corresponding areas of the second circuit board 38. A probe 42 (see Figs. 5, 6) as the output terminal 26 of Fig. 11 protrudes into the second waveguide groove 40 of the sub-casing 32 from one end of the second circuit board 38. Because of the requirement for providing a large amplification, all the other circuit components, i.e., the power amplifiers 22, 24 and 25 of Fig. 11, comprise bare semiconductor chips 43 as shown in Figs. 5, 6. These bare semiconductor chips 43 are inserted in the corresponding through-holes 38a provided in the second circuit board 38, are bonded to the inner bottom surface of the sub-casing 32 with a conductive adhesive, and are connected to a conductive pattern (not shown) on the second circuit board 38 by wire bonding as shown in Figs. 5, 6.

Please rewrite the paragraph beginning on page 13, line 13 and ending on page 14, line 17 as follows:

The radiation plate 33 (see Figs. 4, 5) has a protrusion 33a (see Fig. 4), the width of which is formed slightly smaller than that of the opening 30a of the main casing 30. The sub-casing 32 and the radiation plate 33 are integrally bonded at the bottom of the sub-casing 32 and the top of the protrusion 33a, a radiation sheet 44 being interposed therebetween, thus forming the unified radiator 31 (see Fig. 4) as described above. The adhesive radiation sheet 44 (see Fig. 5) composed of, e.g., a silicone based resin, smoothes fine irregularities on the contact surface between the sub-casing 32 and the radiation plate 33. As shown in Fig. 7, while being inserted into the opening 30a, the radiator 31 is screwed to the bottom of the main casing 30 such that slight gaps G are maintained between the sidewalls of the protrusion 33a of the radiation plate 33 and those of the opening 30a of the main casing 30 in order that the protrusion 33a of the radiation plate 33 does not come into contact with the main casing 30. Further, as shown in Fig. 8, the main casing 30 has pluralities of

depressions 45 and projections 46 which are alternately formed on the bottom of the main casing 30 with the opening 30a interposing therebetween. The projections 46 serve as contact surfaces between the bottom of the main casing 30 and the radiation plate 33 so as to join the main casing 30 and the radiation plate 33. The depressions 45, each being placed between adjacent projections 46, reduce the contact area between the bottom of the main casing 30 and the radiation plate 33, thereby reducing the amount of heat transfer from the radiation plate 33 to the main casing 30.

Please rewrite the paragraph beginning on page 14, line 18 and ending on page 15, line 17 as follows:

As shown in Fig. 9, the lid 35 has an outwardly projected flange 35a integrally formed on the outer surface thereof and a waveguide through-hole 47 penetrating the flange 35a. The lid 35 is attached to the outer surface of the sidewall of the main casing 30 so as to cover the side of the opening 30a and is screwed to the sub-casing 32, which is exposed at the opening 30a, and to the main casing 30. With this configuration, the inner flat surface of the lid 35 covers the first waveguide groove 34 of the main casing 30 and the second waveguide groove 40 of the sub-casing 32, thus allowing the first waveguide groove 34, the second waveguide groove 40, and the lid 35 to form a waveguide. The first waveguide groove 34 has an inclined plane 34a formed at an end of the waveguide at an angle of about 45° with respect to the longitudinal center line of the waveguide so as to be in continuous connection with the waveguide through-hole 47 of the lid 35 in the vicinity of the inclined plane 34a. Accordingly, high-frequency output signals at the probe 42 of the hybrid power-amplifier circuit 3 of Fig. 11 travel in the second waveguide groove 40 and the first waveguide groove 34, are reflected at the inclined plane 34a, pass through the waveguide through-hole 47, and are emitted from the flange 35a of the lid 35 in that order. Further, a mating waveguide 48, indicated by the two-dot chain line in Fig. 9, is mounted on the end surface of the flange 35a. The waveguide 48 is connected to the duplexer as above described (refer to Fig. 10).

Please rewrite the paragraph on page 16, lines 6-22 as follows:

Also, the circuit components of the intermediate-frequency amplifier circuit 1 and the local oscillator circuit 2 of Fig. 11 are mounted on the first circuit board 36 disposed in the main casing 30 as shown in Fig. 2, the circuit components of the hybrid power-amplifier circuit 3 of Fig. 11 are mounted on the second circuit board 38 hermetically disposed in the sub-casing 32 as shown in Fig. 2, and additionally the probe 42 provided on the second circuit board 38 protrudes into the second waveguide groove 40 as shown in Fig. 9. With this configuration, the hybrid power-amplifier circuit 3 is shielded against the intermediate-frequency amplifier circuit 1 and the local oscillator circuit 2 in the main casing 30. Accordingly, high-frequency signals transmitted from the hybrid power-amplifier circuit 3 are unlikely to leak into another circuit even when the frequencies used for the satellite communication system become higher, e.g., up to about 30 GHz, thereby preventing fluctuation of the output of the hybrid power-amplifier circuit 3.